S P E C I F I C A T I O N

WIND-DRIVEN TWIN TURBINE

BACKGROUND OF THE INVENTION

The field of the invention is electrical generation and the invention relates more particularly to wind-driven electrical generation.

Wind has been used to drive machinery for centuries, but recently with the concern of greenhouse gas buildup, use of wind to generate electricity has received increasing interest. Wind generation is commercially used in many parts of the world and the most common style of commercial wind turbine generator utilizes a rotor, typically with three blades. The rotor typically turns a horizontally oriented shaft, which provides input to a gear box, which increases the rotation speed and turns a generator which converts the shaft power into electrical power. Usually, the pitch of the blades can be adjusted to regulate the speed during normal operation and also to shut down the machine when wind speeds are excessive. Most modern wind turbines start operating when wind speeds reach about 12 miles per hour and achieve their rated power at about 25-30 miles per hour and shut down at wind speeds above 35-40 miles per hour.

Unfortunately, a great deal of potential power generation is lost because of the necessity of shutting down the windmill in

wind speeds above 35-40 miles per hour. Wind turbines which do not use rotor blades have been patented but have not found commercial application. One such design is shown in U.S. Patent No. 4,764,683. The generator uses a pair of helical rotors positioned so that a portion of the blades extend beyond forward and rear "nacelles."

A vertical axis wind-powered generator is shown in U.S. Patent No. 5,038,049. This device uses a cylindrical rotor having a vertical axis with a plurality of wind-driven veins. A curved inner modulator is mounted on the base inside the rotor to control the wind flow through the rotor. An inlet modulator is rotatably mounted on the base for controlling wind flow to the rotor.

BRIEF SUMMARY OF THE INVENTION

It is an object of the present invention to provide a wind-driven turbine which is capable of generating electricity without having to shut down in winds in excess of 40 miles per hour.

The present invention is for a wind-driven turbine assembly useful for the generation of electricity. The assembly has a frame with a front opening for the entrance of the flow of wind and the frame has a floor, a right side, a left side, and a back. A right and a left turbine are rotatably supported by the top and floor of the frame. Each of the right and left turbines have a vertically oriented central support pipe having a plurality of

air passageways therethrough. A plurality of blades are held by each of the vertically oriented support pipes and the blades are generally vertically oriented and extend outwardly to an outward edge so that as each turbine rotates its outer edge subscribes a circle within the frame. Each such circle has an outer edge oriented near the respective right side and left side of the frame. Each central support pipe has an upper and a lower end support frame for providing support means for holding the support pipe in a vertical position and at least one of the upper and lower end support frame has openings to permit the flow of air outwardly from an inner area of the support pipe. A nose cone is supported vertically in the front opening of the frame, having a rightwardly oriented face and a leftwardly oriented face for diverting the flow of wind away from the center of the front opening to create a right air stream and a left air stream. A right side door and a left side door is each hingedly held across the right and left sides respectively of the frame by a vertical hinge positioned nearer the front opening of the frame than the back opening of the frame. These side doors are movable from a closed position angularly aggressively to let more wind pass between the outer edges of the blades and the respective side doors. Each side door is biased toward the closed position whereby a right side airstream flows against the blades of the right turbine and along the right side door, and a left side airstream flows against the blades of the left turbine and along

the left side door, thereby urging the turbines to turn in opposite directions. A back panel is held across the central area of the back of the frame and this back panel, together with the top, bottom, right turbine, and left turbine, form a rear central space. Means are provided for releasing air from the rear central space to the outside of the frame. A right and a left adjustable baffle are held across the back of the frame adjacent the back panel and the right and left adjustable baffles are hingedly held at the tight and left edges of the back panel. Means are provided for setting the amount of opening of the right and left adjustable baffles, whereby when a stream of air enters the front opening of the frame, such stream of air is directed by the nose cone into a right air stream and a left air stream. Part of the right and left air streams pass through the air passageways in the vertically oriented central support pipes of the right and left turbines and exit through the support pipe. Electrical generating means are operably connected to the turbines to produce electrical energy. A wide mesh screen is placed over the front opening to prevent the entry of large objects which would interfere with the rotation of the turbines. Baffles may be provided within the frame to direct the flow of air in an optimum manner. Front, right, and left wind baffles may be further provided to control the flow of air into the front opening. The outside diameter of the turbines is typically between 2 and 8 feet, with 8 to 30 blades in each turbine.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view showing the front, top, and right side of the wind-driven turbine assembly of the present invention.

Figure 2 is a top view thereof.

Figure 3 is a perspective view of one of the turbines of the assembly of Figure 1.

Figure 4 is a cross-sectional view taken along line 4-4 of Figure 2.

Figure 5 is a side view of the right turbine of Figure 2.

Figure 6 is a perspective view of the wind-driven turbine assembly of Figure 1 shown on a stand.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The wind-driven turbine assembly of the present invention is shown in perspective view in Figure 1 and indicated generally by reference character 10. Turbine assembly 10 has a frame 11 which has a front opening 12, a floor 13, a left side 14, a right side 15, a top 16, and a back 17. The front opening 12 has a nose cone 18. Nose cone 18 has a leftwardly oriented face 19 and a rightwardly oriented face 20.

Frame 11 is aimed so that the flow of wind enters the front opening 12. Two airstreams, namely a leftward airstream 21 and a rightward airstream 22, are diverted as shown in Figure 2 toward the left and right sides of frame 11.

The front opening 12 of frame 11 is covered by a screen 23 to keep birds and other objects from entering the front opening 12. Front opening 12 preferably has angled faces 20 along the bottom opening, 25 and 26 along the left and right openings, and 27 along the top to help direct air inwardly into front opening 12.

Turning now to Figure 2, left turbine 28 is vertically mounted within frame 11 and has a vertically oriented central support pipe 29 from which a plurality of blades 30 are affixed. As shown in Figure 3, the turbine has an upper end support frame 31 and a lower end support frame 32, which support the blades as well as the support and output shaft 33.

The vertically oriented central support pipe 29 has a plurality of air passageways 34 which permit the flow of air into the support pipe 29, and there are openings 35 on the top and/or bottom of the frame 31/32 to emit the flow of air from the interior of the support pipe to the exterior of the frame. Right turbine 36 has the identical features.

As shown in Figure 2, left airstream 21 is directed by face 19 toward the left side 14 of the frame, which supports a left side door 37. Left side door 37 is hingedly connected at 38 to the left side of the frame near the front opening 12. Door 37 is biased toward a closed direction by spring 39 and preferably has an outwardly angled portion 40. As the flow of wind increases, door 37 is forced slightly more open so that excess may pass

between the outer circle 41 subscribed by blades 30 and left side door 37. This flow of air turns left turbine 28 in a clockwise direction, as viewed in Figure 2 and indicated by reference character 42. Left airstream 21 exits as indicated by arrows 43 and 44.

A second control is preferably provided by a pair of rear baffles 45 and 46. Left rear baffle 45 is hingedly connected at hinge 47 to a back panel 48 affixed to the back of the frame 17. A hydraulically or otherwise controlled arm 49 positions left rear baffle 45 and is pinned at 50 to frame member 51. Similarly, right rear baffle 46 is positioned by arm 52 and is operated by hydraulic or other motor means and is pivotally pinned at 53 to frame member 51. The position of the rear baffles helps direct the flow of air out through the side and rear of wind-driven turbine assembly.

An inner volume 53 exists between back panel 48 and the left and right turbines. Since air pressure tends to build in this area, an air vent 54, shown in Figure 1, provides an outlet for any such air buildup.

Air entering the right side is diverted by face 20 and exits as indicated by arrows 55 and 56. Right side door 57 is hingedly connected at 58 to frame 11 and is biased by spring 59 toward a closed position.

The openings in the vertically oriented central support pipe are shown in Figures 3 and 4. In Figure 4 it can be seen that

the generators 60 and 61 are positioned below frame 11, which is useful for maintenance for larger wind turbines, being more easily accessed from below.

The wind turbine of the present invention can further contain controlled front baffles 67 as shown in Figure 6. Fixed baffles, two of which are indicated in Figure 2 by reference character 63, may be added to further direct the flow of wind through the frame. The blades, as shown in Figure 2, are preferably curved and set at 60° to 90° with respect to the central support pipes. The turbines are anticipated to be capable of being made very large with a size range anticipated between 2 feet and 18 feet in outside diameter with a length between 3 feet and 20 feet. The number of blades per turbine is preferably between 8 and 30 blades with an anticipated minimum top RPM of 140.

The function of the holes in the center pipe is to get rid of dead air which forms as the turbines turn. The dead air can pass outwardly to the top of the frame as shown in Figure 4 of the drawings through openings 65 and 66. It is anticipated that in cold climates, deicers utilizing hot water or steam may be used.

The present embodiments of this invention are thus to be considered in all respects as illustrative and not restrictive; the scope of the invention being indicated by the appended claims rather than by the foregoing description. All changes which come

within the meaning and range of equivalency of the claims are intended to be embraced therein.